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RELATIONSHIP BETWEEN FAIR VALUE ACCOUNTING AND FINANCIAL CRISIS OF EUROPEAN BANKING INDUSTRY

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Abstract *: The study aims to prove a correlation between fair value accounting and the financial crisis in European banking. The use of fair value accounting is considered to exacerbate the financial crisis and is the reason for the re-use of historical cost accounting. By using a logit regression model, this research proves that more fair value-oriented accounting indexes have a weaker relationship with the financial crisis in the banking system than more historically-oriented accounting. However, the grouping of fair value accounting valuation model into three levels creates different strength of the relationship with the financial crisis. The lower the level that is used in an accounting index, the stronger the association between fair value accounting and the financial crisis in the banking system. Moreover, it has been proven that the use of fair value accounting index on liabilities produces a stronger association with the financial crisis in the banking system than when it is used on assets.*

Keywords*: fair value accounting, return, financial crisis, historical cost.*

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1. Intruduction

After the financial crisis in 2008 hit many businesses extensively, some claim that fair value accounting (FVA) adopted in certain accounting standards and financial regulations merely exacerbates financial turmoil (Jassa 2008; Veron, 2008; Khan, 2010; Badertscher et al. 2012; Masoud and Daas, 2014). Experts are split into three camps on this issue: those who agree (criticism), disagree (defenders), and those who remain impartial (Laux and Leuz 2009; Shaffer 2010). Discussion on these issues intensifies after countries around the globe are urged to adopt IFRS which emphasizes the principle of fair value in asset and liability valuation (Laux and Leuz, 2009).

To shed light on the relationship between FVA and the financial crisis, various analytical approaches have been offered. In general, there are two approaches to the analysis of the correlation between FVA accounting and financial crisis: qualitative (argumentative) and quantitative (empirical). Ryan (2008) divides the quantitative research approach into two, empirical-archival research (focusing on empirical evidence) and experimental behavioral research. Ryan (2008) further argues that the most likely exploration conducted by accountants in explaining the relationship between FVA accounting and financial crisis issues is an experimental behavior research method. The reason is that the data used to prove FVA contribution to the financial crisis in empirical research is limited. Previous FVA empirical researches (such as Barth, 1994), do not discuss its links with the financial crisis.

Bonaci, Matis, and Strouhal (2010) note that 39 papers were already published in leading journals around the world from 2005-2009, dealing with themes related to fair value. Most of the – seven papers – are in the Journal of Accounting Research. Differing opinions expressed in those 39 papers can be classified into pros, cons, and neutral with most papers give theoretical reviews. After exploring the articles, they conclude that the FVA has been made a scapegoat for the crisis.

Most of them criticize the practice of placing a fair value pricing model into three levels (level 1, 2 and 3). These levels reflect the mechanism of price formation and liquidity aspects. In level 1, (mark-to-market) prices are derived directly from active markets without any adjustment. Prices at level 2 are set from the observable input

identical to active markets or relevant markets. If level 2 price cannot be obtained, FVA level 3 is used in which price is determined using a model (mark-to-model). Possibility to use level 3 model has been criticized since it may trigger the financial sector (banking) rush. Prices in level 3 are more subjective and prone to potential managerial bias with more significant information risks, indicating measurement errors and the use of the improper model (Goh Et al., 2009). Moreover, level 3 prices inadvertently create opportunities for earnings management discretion (Fiechter and Meyer, 2010)

Khan (2010) states that problems with FVA are associated with regulatory compliance on capital adequacy ratios and solvency of banking by regulators. If there is an event that the market responded with a decrease in the value of an asset or liability, the provisions of FVA can encourage companies to sell assets to avoid breaching the solvency limit. The result is the release of excess assets (fire sales) which may trigger a drastic decline in prices and increase chances for failure of the systemic financial system (Badertscher et al., 2012). The sale of these assets has a significant impact on prices in the short term when the market is not liquid.

Khan (2010) argues that a drop below the 10th of percentile bank's monthly return as influenced by difficulties of the banking system during a period of observation (time-series) is seen as a proxy for a financial crisis. Badertscher et al., (2012) and Allen and Carletti (2008) identified crisis as the drastic fall in asset prices due to massive asset sales to maintain the required capital ratio. For that reason, they examine the impact of FVA to the crisis by making a comparison between the sale of banking assets valued at fair value method before the crisis and during the crisis. The results of empirical testing of the two approaches above also yield different conclusions. Khan (2010) concluded that increased systemic risk in the banking network is associated with the presence of FVA. On the other hand, Badertscher et al., (2012) prove that FVA is not associated with the crisis because there is no increase in the sales of securities during the crisis.

Another camp, in response to these contradicting claims, believes that historical accounting (HCA) can be a solution. However, the issue is merely argumentative, and

no empirical research has existed in support of this opinion. Hence, a study that provides empirical evidence about the relationship between FVA and HCA on the financial crisis is required. Furthermore, a question remains unanswered about which level out of all three levels of FVA that lends the most impact on the crisis. This study analyzes European banks using logit regression method. Results of this study are expected to unravel the exact facts about the issue of fair value accounting linkages with the crisis.

2. Theoretical Basis and Hypothesis Development

2. 1. Fair Value Accounting Definition

SFAS 157 defines fair value as "the price to be received to sell an asset or liability in regular transfer payments transactions between market participants at the measurement date". IAS 50 (revised 2010) defines fair value as "the value of an asset could be exchanged or a liability settled between knowledgeable, willing parties to conduct fair transactions (arm's length transaction)". According to Shaffer (2010), fair value is defined as 'an exit price that can be observed in an orderly market'. Appraisers determine fair value as the price at which property would be exchanged willingly between buyers and sellers, with each having knowledge of all relevant facts and both are seen as equal (King, 2006).

In SFAS No. 50 (revised 2010), fair value is broadly divided into two, prices quoted from an active market and other valuation techniques. These other valuation techniques include fair, updated market transactions between informed and willing parties, if available; references to current fair value from another instrument that is substantially the same; discounted cash flow analysis; and option pricing model. When prices are available in active markets for similar assets or liabilities, they should be used as a measurement to fair value (level 1). Otherwise, level 2 prices should apply for observable inputs, including quoted prices for assets or liabilities in active markets, cited prices for identical or similar assets in inactive markets, and other relevant market data. If it still does not exist, level 3 prices apply to unobservable inputs. The 3rd level uses a model to draw the fair value.

Definition of fair value is based on several assumptions: a) the price obtained is the output price (exit price), and it is a transaction between market participants; b) market participants who are involved should have free will concerning assets or liabilities and are not coerced; c) in the case of a forced sale, purchase and sale transactions are not carried out by market participants (Krumwiede, 2008)

2. 2. The position of FVA and Crisis

Laux and Leuz (2009) review some critical points of debate around the issue of FVA and crises that need attention. First, the controversy about FVA is due to confusion over what is new and different from the FVA and differing views about the purpose of the FVA. Second, there is no absolute clarity on FVA implementation stipulated in accounting standards. It is possible, however, that the standards themselves are the source of the problem because they allow uniformity of application due to allowable deviations under certain conditions. Third, the Historical Cost Accounting (HCA) is not a solution because there are some essential aspects of HCA and the problem is even more extensive than the FVA. Fourth, implementation turns out to be a vital issue for connection with litigation.

Not only does SFAS statement 115 divide securities into trading, available-for-sale, and held-to-maturity along with their listing requirements, it also affects how earnings are reported. If an asset rated using FVA has more/less value than the book value, it will be recorded as a profit/loss. Such profit/loss can be added into net income or comprehensive profit depending on whether the excess is temporary or permanent. A temporary surplus will be reported in comprehensive income and permanent one (other-than-temporary impairment / OTTI) in net income. Making such a decision is also the prerogative management. Badertscher et al. (2010) prove that the sale of securities (AFS and Held to Maturity / HTM) that the sale of securities (AFS and Held to Maturity / HTM) is not affected by any component of earnings but changes to OTTI and decrease in capital ratio. Changes to OTTI do not affect the primary capital of most major banks with insignificant sales pressure and procyclical behavior (Shaffer, 2010).

Sapra (2008) shows that HCA is not suitable for the projection of sustainability (inefficient continuation). FVA, on the other hand, can be used to make a more precise prediction because it is more informative; the demands for full power is based on current price signals. However, such liquid judgment has severe contagious effects. As a result, conclusions drawn from FVA can only be better than those from HCA under a condition that losses due to contagion is relatively smaller than the losses from inefficient continuation.

Results of Barth's research (1994) shows that the fair value of investment securities has a higher explanatory power than that of historical cost. However, when tested against profit/loss on securities, results can be different. In some specifications, the fair value gain/loss on securities does not have significant ascending explanatory power (incremental). While the estimated fair value of investment securities seems reliable and relevant for investors in bank equity valuation, fair value gain/loss on securities does not.

2. 3. Banking Systemic Risk

Systemic risk is the probable decline or breakdown in a system, as opposed to a decline in individual parts or components (Kaufman and Scott, 2000). According to Khan (2010), the core concept of systemic risk in banking is the notion of interbank contagion. Contagion, as Bekaert, Harvey, and Ng (2005) suggests, is an expectation that is too strong or too weak about economic fundamentals. In general, contagion refers to the intention behind the spread of market turmoil during a declining condition (downside), from one country to another as an observed process through co-movement, exchange rate, stock prices, the distribution of sovereignty and capital flows. The essence of systemic risk is a contagion effect, another form of various external effects (De Bandt and Hartmann, 2000). Hence, the two terms are often used interchangeably.

Generally, contagion is divided into two categories (Karolyi, 2004). The first category emphasizes co-movement in financial asset prices as a result of normal interdependence between market economies coming from connectedness between the

real and financial economy (fundamental-based contagion). The second category highlights financial panic (irrational contagion), follow the herd behavior, loss of confidence and a rise in risk-aversion attitudes. Karolyi (2004) adds that the conception of 'irrational co-movements' as a form of contagion focuses on excessive co-movement in the price contained on capital flow, volatility or market disruptions and market real return assets.

2. 4. Hypothesis development

Institutional banking networks (linkages) are becoming more common nowadays, and interdependence among them help make the financial position more inter-connected (Kiyotaki and Moore, 2002). If the market is in an unstable condition (crisis), the price formation mechanism may become erratic and volatile. Assessment of an asset or liability based on market price quotations undoubtedly can change a company's financial position owing to extreme irrationality (emotion) of market participants. In such circumstances, the use of FVA will aggravate the crisis. When the banking and financial sector are globally connected, the shocks at one bank can spread quickly to other banks (Gropp *et al.* 2009; Iyer and Peydro 2010).

There are at least two reasons to support the opinion that the application of FVA rules has exacerbated the financial crisis (Badertscher et al., 2010). First, when a crisis occurs, the market price is a poor indicator for long-term assessment of certain assets. Second, there is a sale pressure pushing the market price below fundamental value because banks embark on fire sales offering their assets as a response to price volatility and to maintain their capital ratio. Under FVA rules, banks are forced to mark down the value of their assets below fundamental value due to the absence of a capital guarantee which may lead to price reduction.

As linkage among banks grows stronger, banks with significant capital position or money-center banks assume considerable importance. Policies that they make will have a broad impact. Any performance of major banks will be likely to affect other banks through the mechanism of FVA. This is evident from the fact that companies with a low capital ratio which happen to make slow sales also suffer from a similar

impact as companies with a high capital ratio (Badertscher et al., 2010). This means that there is a higher probability that a bank suffers from a downside return when money-center banks perform poorly when the accounting index is fair value-oriented. Based on the description above, the first hypothesis is proposed as follows:

H1: a fairer value-oriented accounting index is associated with the financial crisis in the banking system

Allen and Carletti (2008) propose that the use of FVA (mark-to-market) is not intended to increase welfare because it creates a contagion among banks and insurance sector. They argue that a similar condition does not occur in HCA. On the one hand HCA, unlike FVA, fails to reflect the appreciation of the current market assets valuation as reflected in price signals. On the other hand, FVA potentially adds endogenous volatility to the forming price (Sapra, 2008). In an interconnected market, this will only aggravate the crisis.

It should also be noted that the formation of prices in the market does not always reflect the fundamental value of assets or liabilities (Laux and Leuz, 2009). It is almost impossible to combine the need for relevance and reliability of accounting information in a single method of assessment (Suwardjono, 2005:179). Thus, the claim that FVA is superior to HCA is questionable. Moreover, FVA utilizes three levels in which markets will respond differently (Goh *et al.* 2009). Because FVA is relatively short-lived in nature and liquid compared to HCA (Sapra, 2008), its application in a moment of crisis needs prudence. On the contrary, the long-lived HCA is better in preventing companies from falling into bankruptcy resulting from short selling or 'fire-sales'. HCA is more capable of dampening price shocks arising from the illiquid market because price formation is more stable.

However, there has been no research that provides empirical evidence about the advantages of FVA over HCA or vice versa. If the linkage between FVA and HCA is a trade-off, the historical accounting should not be associated with the crisis. Furthermore, this study took a sample of European countries not experiencing severe losses due to the financial crisis in 2008 as the USA did. During this condition, the

alleged historical accounting used by European banks proves to reduce or at least does not exacerbate the crisis. Based on the description above, the second hypothesis is formulated as follows:

H2: a more historical cost-oriented accounting index is associated with the financial crisis in the banking system[†]

In the FVA mechanism, liquidity is a factor that the market focus on (Laux and Leuz, 2009). Goh et al. (2009) prove that the market underappreciates an asset assessed using a mark-to-model method the market as compared to an asset valued at mark-to-market method. This means that the lower the valuation model used by banks, the higher the chances for the market not to respond. However, if the bank is audited by better auditors or the banks have excess capital adequacy, the price of fair value of assets will be higher. This is a loophole that company management can exploit to manage earnings by making discretion of illiquid assets (unverifiable fair value) (Ramanna and Watts, 2007)

The subjectivity and measurement errors in the assessment of mark-to-model may lead to a bias in the formation of price. As a consequence, investors may find themselves in higher risk and lower quality of information. This is the reason market participants consider that mark-to-model assets are lower than the mark-to-market. Thus, the greater the dispersion of the valuation of fair value from the primary model, the greater the contribution to the crisis.

[†] Based on ways of expressing hypothesis and the principle of consistency, the writer expresses only the second hypothesis in the form of alternative hypotheses. The expected significance is the null hypothesis, as constructed according to the previous argument.

Based on the above description, the proposed third hypothesis is as follows:

H3: the accounting index method that is more oriented to low-level fair value correlates more strongly with the financial crisis in the banking system

Khan (2010) formulates fair value by combining securities account assets and liabilities at the same time (held-to-maturity, available for sale, trading assets,

mortgage servicing rights, other financial assets, derivative contracts, trading liabilities, and other financial obligations). The proxy is not appropriate because assets and liabilities have different characteristics, especially the credit risk and the debt value. Several studies have shown links between increased credit risk and the impact of negative net equity value (Vassalou and Xing, 2004). For that reason, the FVA valuation should treat assets and liabilities differently based on their contribution to the financial crisis

Barth et al. (2008) demonstrate that equity returns are negatively related to changes in credit risk. This relationship will be less negative when firms have more debt. Also, they assert that these findings empirically associate and indicate the existence of two and countervailing and robust relationship. The linkages between the impacts of equity value and an increase in credit risk may: (1) lower the value of equity probably as a result of asset impairment, (2) raise the value of equity-related decline in the value of debt, possibly coming from a decline in asset values or an increase in asset risk. They conclude that an increase (decrease) in equity value correlates to a decrease (increase) in a value of the debt that comes from the increase (decrease) in credit risk.

This study suspects that FVA valuation on liability would be more influential to the banking crisis than FVA valuation on an asset. Shaffer (2010) points out a capital decrease experienced by most banks is more likely due to loan portfolio rather than an influence of FVA (assets) during the crisis. Also, Fiechter and Meyer (2010) prove that level 1 fair value of liability contributes more positively to the level of financial discretion (earnings management) compared to level 1 fair value of assets. Based on the description above, the proposed fourth hypothesis is as follows:

H4: the index method of accounting that is more oriented to a fair value of liabilities associates more strongly with the financial crisis in the banking system than the fair value of assets

3. Research Method

3.1. Sampling

Samples for the study were banking industry in Europe from 2005 to 2010, taken using purposive sampling method available at OSIRIS database FEB UGM. European banking industry was selected as samples because it has adopted IFRS since 2005 (Armstrong et al. 2010). Most discussions about systemic risk are focusing on the banking industry (Nijskens and Wagner, 2010; Festic et al. 2011). Banking is a sector that has the most number of assets in its balance sheet assessed using fair value (Goh et al., 2009). Second, the European banking industry seems to have more aversion to FVA than its American counterpart (Laux and Leuz, 2009). Third, post-crisis growth in Europe is experiencing a slowdown since several major European banks have assets that exceed the amount of their respective country's GDP (Overtveldt, 2009:187). Currently, the whole world is watching the European continent in anticipation of spreading crisis (Goodhart, 2011).

3.2 Hypothesis Testing Model

The model used in this study refers to the model used by Khan (2010) with some modifications. Khan (2010) uses a logit model to test whether banks in a particular month display tendency to get the lowest return of their return time series and when the index of money center banks also gets a bad return, they increase as a method of reporting is more fair value oriented. The logit model is used because it can calculate the nonlinearity return relationship in the worst market condition, allowing for additional risk factors and conditions while leaving the degree of dependence (tail dependencies). To test H1 and H2, the models used are:

$$RK_{i,t} = \alpha_1 + \alpha_2 RBPU_t + \alpha_3 ANW_t + \alpha_4 RBPU_t * ANW_t + \alpha_5 AH_t + \alpha_6 RBPU_t * AH_t + \alpha_7 LNASETI_{i,t} + \alpha_8 T1_{i,t} + error_{i,t} \quad (1)$$

Description:

RK: return times of crisis, banks rated one when i return to time t under the 10th percentile of the return period of observations (time series) bank i and zero if the other

RBPU: return the money center banks, a proxy for financial difficulties in the

banking system which is considered one when the monthly return equally-weight index of money center bank under the 25th percentile within this index return observations and zero if the other. Determination of money center bank is based on the capitalization of the largest capital in each EU country

ANW: fair value accounting, which is used to measure whether the accounting is fair value oriented. ANW is calculated from the ratio of the value of assets that are recognized or disclosed at fair value by the banks to the value of total assets

AH: historical accounting, the net assets that are not assessed with fair value. AH was calculated from the net assets (net assets) minus the ANW

LNASETI: natural logarithm of a bank assets

T1 : the ratio of tier 1 bank capital

H1 acceptance criteria could be seen from the level of significance and the positive direction of α4, while acceptance criteria H2 could see from no significance of α6. To test the H3 model (1) above the variable ANW will be split into two tiers (levels).

ANW1 or level 1 is the asset prices traded in an active market (mark-to-market), is ANW2 or level 2 is an illiquid asset is derived from mark-to-model (Goh et al., 2009).

ANW2 itself is a proxy for a combination of fair value accounting model level 2 and level 3 with consideration of data availability. To test the H3 model used is:

$$RK_{i,t} = \beta_1 + \beta_2 RBPU_t + \beta_3 ANW1_t + \beta_4 ANW2_t + \beta_5 RBPU_t * ANW1_t + \beta_6 RBPU_t * ANW2_t + \beta_7 LNASETI_{i,t} + \beta_8 T1_{i,t} + error_{i,t} \quad (2)$$

Description:

ANW1: the ratio of the amount of assets that are recognized or disclosed at fair

value at level 1 to total assets

ANW2: the ratio of the amount of assets that are recognized or disclosed at fair value level 2 and level 3 to total assets

H3 acceptance criteria can be seen from the magnitude coefficient β5 and β6. Larger coefficient indicates a stronger relationship to the financial crisis and vice versa. The expected value of the β6 coefficient is greater than the β5 coefficient. To test H4, the model used is

$$RK_{i,t} = \gamma_1 + \gamma_2 RBPU_t + \gamma_3 ANW_t + \gamma_4 ANWL_t + \gamma_5 RBPU_t * ANW_t + \gamma_6 RBPU_t * ANWL_t + \gamma_7 LNASETI_{i,t} + \gamma_8\ T1_{i,t} + error_{i,t} \quad (3)$$

Description:

ANWL: the ratio of the amount of liabilities that are recognized or disclosed at fair value to total assets

H4 acceptance criteria can be seen from the comparison of scale coefficients γ6 and γ5. Based on the hypothesis, the expected value γ6 coefficient is greater than γ5 coefficient values.

3.3. Data Analysis Techniques

Descriptive Analysis

Descriptive analysis is a process of collecting, presenting and summarizing various characteristics of the data to describe the data. It was used to determine the average value, minimum, maximum and standard deviation of variables studied.

The Selection of Best Model

Statistical tools to process data in this study was STATA Special Edition (SE) 12 from StataCorp LP (October 13, 2011), which can process the type of logit regression equations with sample type data time-series and cross-section at a time (panel data). Also, SPSS 16 was also used.

The process to select a model was done in two stages, multicollinearity test and comparison of panel logit model estimator. Multicollinearity test was performed to ensure that multicollinearity would not damage the model. After that, the best model estimate was selected among several possible methods of data processing panel (FE, RE, PA, and pooled data). The obtained logit regression method of panel data was used to test the hypotheses model.

Discussion of Hypothesis Testing Results

Theoretical and logical reasons must accompany evidentiary support or rejection of the hypothesis. When a particular fact does not fit into predictions or the researcher needs to collect more evidence, an additional analysis (robustness test) can be done. All of this will be summarized in the chapter discussing the results of hypothesis testing.

4. Results and Discussion

Descriptive Statistics

The average value of 0.399 ANW can be interpreted that the average amount of assets valued at the fair value of the European banking accounting is 39.9% of total assets owned. If fair value accounting (ANW) is divided into 2, ANW1 has a lower average value (0.14812) than ANW2 (0.25071), which means that the proportion of European banking assets valued at fair value using the method of mark-to-market is 14.8% on average, while assets valued using mark-to-model method is 25.1% on average. It appears both variables have mean values that do not show much difference from the median value or can be said to be distributed relatively balanced.

Table 21. Descriptive Statistics

Variable	Mean	Median	Min	Max	SD
rk	0.494	0.000	0.000	1.000	0.501
rk1	-0.002	0.014	-0.923	1.969	0.449
rbpu	0.333	0.000	0.000	1.000	0.472
rbpu1	0.009	0.057	-0.659	0.515	0.384

anw	0.399	0.385	0.375	0.464	0.031
ah	-0.356	-0.342	-0.429	-0.326	0.035
anw1	0.148	0.137	0.092	0.261	0.056
anw2	0.251	0.248	0.203	0.298	0.037
anwl	0.213	0.206	0.165	0.309	0.047
lnaseti	18.872	18.916	14.551	22.060	1.628
t1	8.815	8.200	3.400	27.130	2.483
anwi	0.256	0.228	0.023	0.769	0.158

Number of observation (n): 318.
rk1: return banking (rk) in the form of ratios
rbpu1 : return the money center banks (rbpu) in the form of ratios
anwi: accounting fair value of a bank

To interpret the AH variables, it is necessary to understand how they are derived, i.e., assets minus net assets that have been valued at fair value (Goh et al., 2009). Therefore, AH is not a proportion of the remaining (residual) to total assets in a financial statement structure. Proxy is more appropriately described as the antithesis of net assets proportion which is compared to the proportion of assets valued at fair value. On average, European banks have assessed the composition of liabilities at fair value (ANWL) of 21.25% over the asset with the lowest proportion of 16.48% and the highest proportion of 30.88%. From liability risk viewpoint, the proportion appears to be quite moderate.

Model Selection

STATA SE 12 can also display descriptive statistics panel data to facilitate the initial analysis. If most of the observed variables tend to have a variation on aspects of the between, the model does not fit for testing using the FE, but the RE or PA (Cameron and Trivedi, 2009:607). In observation of the RK and the other main independent variables, the most significant variance is seen on the within, so the possibility of the model used is the FE or PA.

Multicollinearity Test

Gujarati (2003:75) states the 10th classic assumption in the use of the least squares

method is free from perfect multicollinearity. If there is high multicollinearity (near multicollinearity) but not perfect (imperfect), the model is still BLUE (Best Linear Unbiased Estimator). Because this study uses interaction variables, multicollinearity will surely occur. Theoretically, these variables cannot be eliminated because they are the subject of the main problems in this study. Multicollinearity becomes a problem when it is perfect or very high, causing the resulting estimates are no longer precise. For problems of perfect multicollinearity, STATA 12 will automatically discard (drop) the problematic variable. Multicollinearity problem occurs in all the previous hypothesis testing model because there is more than one interaction variable. Therefore, the hypothesis testing model changes done by separating the variables having perfect multicollinearity, so that the model equations obtained are:

$$RK_{i,t} = \alpha_1 + \alpha_2 RBPU_t + \alpha_3 ANW_t + \alpha_4 RBPU_t * ANW_t + \alpha_5 LNASETI_{i,t} + \alpha_6\ T1_{i,t} + error_{i,t} \quad (4)$$

$$RK_{i,t} = \eta_1 + \eta_2 RBPU_t + \eta_3 AH_t + \eta_4 RBPU_t * AH_t + \eta_5 LNASETI_{i,t} + \eta_6\ T1_{i,t} + error_{i,t} \quad (5)$$

$$RK_{i,t} = \beta_1 + \beta_2 RBPU_t + \beta_3 ANW1_t + \beta_4 RBPU_t * ANW1_t + \beta_5 LNASETI_{i,t} + \beta_6\ T1_{i,t} + error_{i,t} \quad (6)$$

$$RK_{i,t} = \delta_1 + \delta_2 RBPU_t + \delta_3 ANW2_t + \delta_4 RBPU_t * ANW2_t + \delta_5 LNASETI_{i,t} + \delta_6\ T1_{i,t} + error_{i,t} \quad (7)$$

$$RK_{i,t} = \gamma_1 + \gamma_2 RBPU_t + \gamma_3 ANWL_t + \gamma_4 RBPU_t * ANWL_t + \gamma_5 LNASET_{i,t} + \gamma_6\ T1_{i,t} + error_{i,t} \quad (8)$$

Hypothesis testing criteria must be adjusted due to changes in the model. Hypothesis 1 can be accepted if $\alpha 4$ is proved to be statistically significant and H2 can be accepted if $\eta 4$ proved to be statistically significant. Acceptance of H3 will be seen from the statistical significance of $\delta 4$ and $\beta 4$, with a value of $\delta 4$ greater than the coefficient $\beta 4$. Hypothesis 4 can be accepted with the provision of the $\gamma 4$ coefficient value greater than the coefficient of $\alpha 4$ and statistically significant.

The consequences of the separation model for the independent variable being tested is the possibility that there are differences in the estimated predictions of each

model (Incomparable). To ensure that the two models being compared are equal and are not disturbed by significant factors outside the model, the mean values predicted by the regressor over regressand of compared models are tested. It is expected the two models being compared have similar mean values.

The comparison panel logit model estimator

PA method has a panel logit model estimator better than FE (not shown). FE model equations cannot be completed due to failure to achieve convergence and no change at an iterative process. Iterative is one method to linearize equations until no substantial changes can be reached in the estimated value of the nonlinear model (NLRMs) (Gujarati, 2003:569). In STATA syntax 12 FE model calculations (and RE) must be terminated by force with the cue-Break-. For this reason, the PA method was chosen as a testing model panel data in this study. Distance variance-covariance matrix of the estimators (VCE) can be minimized with the command syntax vce (robust). Another additional syntax is Corr () to put different restrictions on the relationship error. In the study option Corr (exchangeable) was used to set $\rho\_ts = \rho$ for all $s \neq t$, so the error is assumed equicorrelated. After these two options were added, the command syntax used in this study is xtlogit *depvar* [*indepvar*] [*if*] [*in*] [*weight*] [, pa corr (exch) vce (robust)]

Hypothesis Testing

Univariate Analysis

The analysis was conducted to see an early indication of proof hypotheses before entering the control variables. When the value of RBPU reached 1, at the average of 87.7% return of other banks also dropped. It means that when the main banks were experiencing difficulties or performing poorly (their return was below the 25th percentile), most of the other banks (88%) were affected. This condition indicates the existence of a contagion effect from major banks to other banks in the

European banking system. The difference between the averages RK also proved significant.

When the value of RBPU and D_ANW1 became 1, the return of 87.7% of banks decreased, whereas when the value was 0, the return of 30.2% of banks declined. Therefore when banks opt for fair value accounting level 1 on the asset side and when the return of major banks decreases, 87.7% of other banks will also be affected. At RBPU and D_AH value 1, there are still 75.5% of affected banks. It indicates the strong impact of large banks in the European banking system. Because interactions between variables D_ANW2 and RBPU did not yield value of 1, there was no prediction of RK value in times of crisis.

Table 2 Summary of Univariate Analysis

	Number of Observation	**Mean prediction of RK (rkhat)**
Independent Variable: RBPU		
RBPU = 0	212	0.3018956
RBPU = 1	106	0.8773525
Mean different of RK		0.5754569***
Independent Variable: RBPU and D_ANW		
RBPU*D_ANW = 0	265	0.3924528
RBPU*D_ANW = 1	53	0.999832
Mean different of RK		0.6073792***
Independent Variable: RBPU and D_AH		
RBPU*D_AH = 0	265	0.4414181
RBPU*D_AH = 1	53	0.754717
Mean different of RK		0.3132989***
Independent Variable: RBPU and D_ANW1		
RBPU*D_ANW1 = 0	212	0.3018868
RBPU*D_ANW1 = 1	106	0.8773585
Mean different of RK		0.5754717***
Independent Variable: RBPU and D_ANWL		
RBPU*D_ANWL = 0	212	0.3022532

RBPU*D_ANWL = 1	106	0.8775741
Mean different of RK		0.5753209***

Description:

1. *** Statistically significant in the 1% level.
2. Each independent variable-value ratio (except RBPU) used as a dummy variable with a provision judged as having a value greater than the median value and rated 0 if otherwise.

Results

Table 3 Summary of coefficient values and the significance of the main variables of each model

Model	Variable	Code	Coefficient
4	RBPU*ANW	b_anw	22.91913
5	RBPU*AH	b_ah	-19.66224
6	RBPU*ANW1	b_anw1	89.11543***
7	RBPU*ANW2	b_anw2	-784.6085***
8	RBPU*ANWL	b_anwl	77.73877***

*** Statistically significant in the 1% level.

To ensure that the models compared are equal and are not disturbed by significant factors outside the model, the mean values predicted by the regressor over regressand of compared models are tested. The test results prove that there is no significant difference between models so that the resulting coefficient values can be compared directly.

Table 3 shows that while hypothesis 1 is not supported, hypothesis 2 is. The test results are contrary to the results of a research by Khan (2010) which proves the existence of a relationship-oriented accounting fair value of the index with an increased risk of systemic banking, but in agreement with results of a research by Badertscher et al. (2010) that rejects the claim that fair value accounting exacerbates the financial crisis in the American banking industry. This is because cross-border bank contagion in the European banking industry only occurs in large banks (Grop et al., 2009). Also, there is a tiered cross-border interbank structure in Europe that have multiple channels to connect a chain effect of inter-banking.

B_anw2 variable coefficient value (absolute) is higher than b_anw1 variables, in

support of hypothesis 3. That is, the accounting valuation models using the fair value of the lower level is more strongly associated (absolute) with the financial crisis in the banking system. These results are consistent with the results of research by Goh et al. (2009) who conclude that the market less values the fair value of assets with a lower valuation (using mark-to-model). This will potentially be exploited by management to perform discretionary or earnings smoothing because there are judgment aspects in it (Fiechter and Meyer, 2010).

The empirical test also supports hypothesis 4, that index more oriented to accounting fair value on the liability side is more related to the financial crisis in the banking system than on the asset side. These results concur with Fiechter and Meyer (2010) who prove that the level of fair value on liability side has a positive and significant impact on financial discretion (earnings management) compared to level 1 fair value on assets. These findings indicate that the use of fair value accounting on the credit side is riskier than on the asset side. It supported by Wang and Zhang (2017) research finding that firms use more fair value measures in financial statements associated with greater demand for convertible debt and debt with short maturity.

Additional analysis

Here is some additional analysis that provides empirical support for the proposed study. First, the significant relationship among ANW1, ANW2, and ANWL variables only occur in the context of the accounting measurement of a systemic downward trend in the index return. This relationship did not apply when the object was tested on personal banking.

Second, the variable money center banks (RBPU) seem to have different behavior with the results of testing Khan (2010) for the decrease in bank return. This is because there is a layered structure of European banking (Gropp et al., 2009) which amplifies the rejection of hypothesis 1. There is a possibility that the influence of major banks on other banks in the European

banking system does not take the same pattern as it does in the American banking industry. Corporation uses more fair value accounting associated with a higher level of cash holdings (Bick, Orlova, and Sun, 2018). Moreover, by using fair value accounting, firms' analysts may have more accurate earnings forecasts (Ayres, Huang, and Myring, 2017).

Third, the negative coefficient ANW2 indicates that the growing tendency of banks to use low-level fair value accounting index will reduce the tendency of banks to experience decreased return. This negative influence takes the same direction as AH variable but in opposite direction of RBPU against RK. The negative relationship is likely to be nonlinear in the parameters. It can also be caused by differences in the mechanisms or channels influence the major banks in the banking system.

Interaction of RBPU against ANW1, when compared to the interaction of RBPU against ANW2 interaction, shows a decline in banking return and works in the opposite. The practice of using fair value accounting index level 1 when significant banks are performing poorly contributes to the decline of returns of other banks. However, this condition is not found when fair value accounting index is lower.

5. Conclution

5.1. Conclusion

This study aims to obtain empirical evidence of a relationship between fair value accounting and the financial crisis of the European banking industry. By using the logit regression model, the study validates that a more fair-value-oriented accounting index is not associated with the financial crisis in the banking system, quite the contrary of the use of the more historically-oriented accounting index. However, the division of accounting valuation models of fair value into three levels has created different strength of relationships over the financial crisis. The lower level used in a

fair value accounting index is strongly associated with the financial crisis in the banking system. Moreover, this study also validates that the use of fair value accounting index on liabilities has a closer link with the financial crisis in the banking system than the use of fair value accounting index on an asset.

Apart from creating different strengths of the relationship, the division of fair value accounting into three levels also lends different influence on the direction of the financial crisis of the banking system. The fair value accounting method that uses mark-to-market (high level) has a positive effect, while the fair value method of accounting mark-to-model (low level) shows a negative impact on the improvement of the financial crisis the banking system. The direction of both influences over money center banks is in the opposite of each other. The additional analysis and previous researches concur with this study that a fairer value-oriented accounting index has a positive effect on large banks and not on the public banking system. At the same time, this finding supports a layered structure of the European banking system.

5.2 Suggestions for Future Researches

As an improvement to the limitations of this study, some suggestions can be made for future researches, i.e.:

1. There should be more samples and longer observation time and additional appropriate control variables to produce better-grounded conclusions.
2. There is a need to observe other banking systems. If it proves that there is a strong relationship between the use of fair value accounting index and financial crisis in the banking system, causality research can be done.
3. A better understanding of the appropriate use of proxy of accounting variables of fair value and historical accounting is needed to produce a better conclusion about a proxy that reflects reality better.
4. There is a need to delve deeper into the division of fair value accounting model into three levels to better understand the nature of these levels and their influence on the dependent variable.

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